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10/590,910	05/03/2007	Tatsuya Hayashi	2006_1422A	5620

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EXAMINER	
WAITS, ALAN B	

ART UNIT	PAPER NUMBER
3656	

NOTIFICATION DATE	DELIVERY MODE
12/08/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/590,910	HAYASHI ET AL.	
	Examiner	Art Unit	
	ALAN WAITS	3656	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 October 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1,3,6-8,10 and 13-15* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1,3,6-8,10 and 13-15* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *28 August 2006* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "area radially inward of the inclined plane is dented further than a radially innermost portion of the inclined plane" in claim 1, lines 20-21, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claim 1 objected to because of the following informalities: Line 28 recites "grove". This should be changed to --groove--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 6, 8 and 13 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 1, lines 20-21, the limitation "an area radially inward of the inclined plane is **dented further** than a radially innermost portion of the inclined plane" is not supported in the original disclosure as filed. Furthermore, Figure 4 shows the innermost portion of the inclined plane being dented the same amount as the area radially inward of the inclined plane.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3, 7, 8, 10, 13, 14 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 and 13 recite the limitations "the rotational-side member" and "the fixed-side member". There is a lack of antecedent basis for these limitations since they have been removed from the proceeding claims.

Claim 3, lines 25-26, recite the limitation "an inner shaft portion". It is unclear if this inner shaft portion is same inner shaft portion as previously recited in the claim or if it is a separate and new inner shaft portion.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 6, 8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee U.S. 5,988,887 in view of Takahashi U.S. 6,499,882 and Liu U.S. 6,020,664.

Re clm 1, Lee discloses a shaft member (30, Fig. 3A), a member (50), a thrust bearing surface (top of 50) formed on the member, the thrust bearing surface including a dynamic pressure generating groove area having a plurality of dynamic pressure grooves (50a) being arranged thereon, a thrust receiving surface (bottom of 30) provided so as to be opposed to the thrust bearing surface in an axial direction, a thrust

bearing gap formed between the thrust bearing surface and the thrust receiving surface, the thrust bearing gap for generating a pressure by a dynamic pressure effect of a fluid so as to support the shaft member in an axial direction in a non-contact manner by the pressure, wherein a reduced portion (radially outer portion of gap) having an axial width decreasing in a radially outward direction is disposed in the thrust bearing gap, a pumping power of the dynamic pressure generating grooves is maximized in a radially outermost portion of the reduced portion, a highest pressure in the thrust bearing gap is generated in a center portion, each dynamic generating groove of the dynamic pressure generating grooves has a spiral shape (Fig. 3A), an outer-diameter end and a groove width, and for each dynamic pressure generating groove of the dynamic pressure generating grooves, the groove width increases as the dynamic pressure generating groove extends radially outwardly toward an outer periphery of the thrust bearing surface such that a largest dimension of the groove width is disposed at the outer-diameter end.

Lee does not disclose a flange portion, said member axially opposing the flange portion, a depth of each groove in the plurality of dynamic pressure generating grooves being constant, and said thrust receiving surface provided on the flange portion.

Takahashi teaches a fluid bearing comprising disclose a flange portion (2b, Fig. 1), said member (9) axially opposing the flange portion, a depth of each groove (3) in the plurality of dynamic pressure generating grooves being constant, said thrust receiving surface provided on the flange portion. The improvement of Takahashi creates a larger thrust surface area to more securely support the shaft.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Lee and provide disclose a flange portion, said member axially opposing the flange portion, a depth of each groove in the plurality of dynamic pressure generating grooves being constant, and said thrust receiving surface provided on the flange portion for the purpose of creating a larger thrust surface area to more securely support the shaft, as taught by Takahashi.

Lee does not disclose the reduced portion being formed by an inclined plane, an area radially inward of the inclined plane is dented further than a radially innermost portion of the inclined plane, the thrust bearing gap has a uniform portion with a constant width formed on an inner diameter side of the reduced portion.

Liu teaches a fluid dynamic bearing comprising a reduced portion being formed by an inclined plane (33, Fig. 1), an area (flat horizontal portion of 27 that abuts 21 and is radially inward of 33) radially inward of the inclined plane is dented further than a radially innermost portion of the inclined plane, the thrust bearing gap has a uniform portion (flat horizontal portion of 27 that abuts 21 and is radially inward of 33) with a constant width formed on an inner diameter side of the reduced portion for the purpose of providing an economic and effect way to achieve an enhanced bearing stability (col. 2, lines 11-13).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of Lee and provide the reduced portion being formed by an inclined plane, an area radially inward of the inclined plane is dented further than a radially innermost portion of the inclined plane, the thrust bearing gap has a uniform

portion with a constant width formed on an inner diameter side of the reduced portion for the purpose of providing an economic and effect way to achieve an enhanced bearing stability.

Re clm 6, Lee in view of Liu discloses a length of the inclined plane in a radial direction is r and a height of the inclined plane is h (Fig. 1, Liu), however, Lee in view of Liu does not disclose a ration of $h/r \leq 0.01$.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Lee in view of Liu and provide that the ration of $h/r \leq 0.01$, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re clm 8 and 13, the improvement of Liu further discloses a fluid bearing device used in an electric motor comprising a rotor magnet (18, Fig. 1) attached to the rotational-side member and a stator coil (14) attached to the fixed-side member.

Claims 3, 7, 10, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka JP 7-332353 in view of Nakagawa U.S. 2002/0172438 and Ouchi JP 10-269691.

Re clm 3, Tanaka discloses a dynamic bearing device comprising a shaft member (30A, Fig. 2) having a shaft portion, a longitudinal axis and a flange portion (10), the flange portion having an end face (36A) and an outer peripheral surface (35A), a thrust bearing portion (9) having an end face and for generating a pressure by a dynamic pressure effect of a fluid in a thrust bearing gap (between 9 and 10) between

the end face of the flange portion and the end face of the thrust bearing portion, the end face of the thrust bearing portion being opposed to the end face of the flange portion so as to support the shaft member in an axial direction in a non-contact manner by the pressure, the end face of the flange portion faces the thrust bearing gap and is formed of a resin (cross-hatching of Fig. 2), the shaft member includes an outer shaft portion (33A) forming an outer peripheral face of the shaft portion and an inner shaft portion (31b) disposed on an inner periphery of the outer shaft portion, the shaft portion being configured such that when the shaft portion is disposed in a bearing sleeve (2), the outer peripheral face of the shaft portion faces a radial bearing gap (4 and 5) between the shaft portion and the bearing sleeve and the outer peripheral surface of the flange portion is disposed radially farther from the longitudinal axis of the shaft member than the outer peripheral face of the shaft portion, the inner portion has one end thereof facing the thrust bearing gap (top end of 31b) and the other end (bottom end of 30A) thereof extending to a vicinity of an upper end of the shaft portion.

Tanaka does indeed disclose a shaft portion (33A) and flange (10) which are integrally formed of a resin as well as another shaft portion (30A) which is formed of metal and an axial thickness of the resin of the shaft portion (33A) being thicker than the flange portion on an outer diameter side of the flange portion, however, Tanaka does not disclose that the outer shaft portion is formed of a metal, the inner shaft portion and the flange portion are integrally formed of a resin, and an axial thickness of the resin of the inner shaft portion being thicker than the flange portion on an outer diameter side of the flange portion.

Nakagawa teaches a bearing shaft (51, Fig. 1) with a thrust member (62) wherein the outer shaft portion (51) is formed of metal ([0051]) and the inner shaft portion (62) and the flange portion (L-shaped protrusions at sides of 62) are integrally formed of a resin ([0058]) and an axial thickness of the resin of the inner shaft portion (center of 62) is thicker than the flange portion on an outer diameter side of the flange portion (edges of 62), and an inner shaft portion (upper portion of 62) has one end (bottom) thereof facing the thrust bearing gap and the other end (top).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Tanaka and provide that the outer shaft portion is formed of a metal, the inner shaft portion and the flange portion are integrally formed of a resin, and an axial thickness of the resin of the inner shaft portion being thicker than the flange portion on an outer diameter side of the flange portion for the purpose of providing a light shaft which reduces the load to be applied to the thrust bearing ([0053]).

Tanaka further does not disclose that at least part of the end face of the flange portion facing the thrust bearing gap is formed as an inclined plane, the inclined plane being inclined so as to approach the opposed end face of the thrust bearing portion in a radially outward direction.

Ouchi teaches a hydrodynamic bearing device having at least part of the end face (115, Fig. 1) of the flange portion facing the thrust bearing gap (between 116 and 115) is formed as an inclined plane, the inclined plane being inclined so as to approach the opposed end face of the thrust bearing portion in a radially outward direction.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Tanaka and provide that at least part of the end face of the flange portion facing the thrust bearing gap is formed as an inclined plane, the inclined plane being inclined so as to approach the opposed end face of the thrust bearing portion in a radially outward direction for the purpose of compressing the fluid the most at the outermost circumference of the flange to provide improved thrust load support (abstract).

Re clm 7, Tanaka does not disclose that a ratio is set such that $h/r \leq 0.01$ where a length of the inclined plane in a radial direction is r and a height of the inclined plane is h.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Tanaka and provide a ratio is set such that $h/r \leq 0.01$ where a length of the inclined plane in a radial direction is r and a height of the inclined plane is h, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involve only routine skill in the art. *In re Aller*, 105 USPQ 223.

Re clm 10 and 14, Tanaka further discloses that a rotor magnet (27, Fig. 4) is attached to the rotational-side member and a stator coil (28) is attached to the fixed-side member.

Re clm 15, Tanaka further discloses that the inner shaft (30A) extends along substantially the entire length of the outer shaft member (34A).

Response to Arguments

Applicant's arguments with respect to claims 1, 6, 8, and 13 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments filed October 11, 2011 have been fully considered but they are not persuasive.

Applicant argues that the combination of Tanaka in view of Nakagawa and Ouchi does not disclose an inner shaft portion having one end thereof facing a thrust bearing gap and the other end thereof extending to a vicinity of an upper end of the shaft portion, however, Tanaka does indeed disclose this limitation. Nakagawa also discloses the differing thickness of the resin between the inner shaft portion and the flange portion.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Tanaka U.S. 2001/0022869 discloses a similar inclined plane to the invention in Figure 1.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALAN WAITS whose telephone number is (571)270-3664. The examiner can normally be reached on Monday through Friday 7:30 am to 5 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on 571-272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Alan B Waits/
Examiner, Art Unit 3656

/Thomas R. Hannon/

Primary Examiner, Art Unit 3656